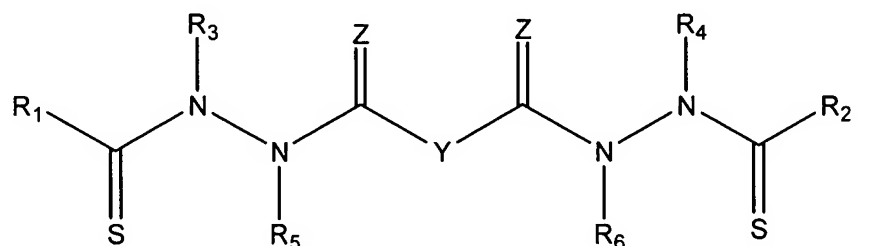


CLAIMS

What is claimed is:

1. A method of treating a subject with a multi-drug resistant cancer, said method comprising administering to the subject an effective amount of a compound represented by the following structural formula:



or a pharmaceutically acceptable salt thereof, wherein:

- Y is a covalent bond or a substituted or unsubstituted straight chained hydrocarbyl group, or, Y, taken together with both $>\text{C}=\text{Z}$ groups to which it is bonded, is a substituted or unsubstituted aromatic group;

- R_1 - R_4 are independently -H, an aliphatic group, a substituted aliphatic group, an aryl group or a substituted aryl group, or R_1 and R_3 taken together with the carbon and nitrogen atoms to which they are bonded, and/or R_2 and R_4 taken together with the carbon and nitrogen atoms to which they are bonded, form a non-aromatic heterocyclic ring optionally fused to an aromatic ring;

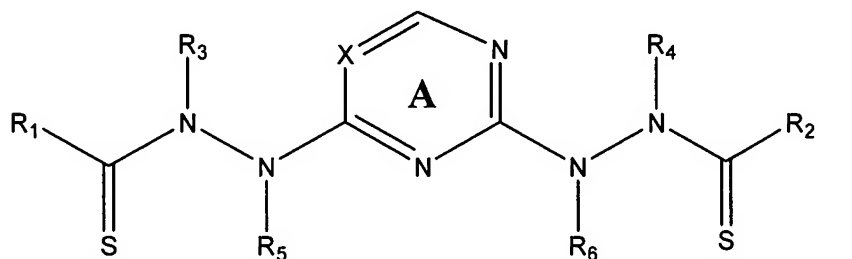
R_5 - R_6 are independently -H, an aliphatic group, a substituted aliphatic group, an aryl group or a substituted aryl group; and

Z is =O or =S.

2. The method of Claim 1 wherein R_1 and R_2 are the same and R_3 and R_4 are the same.

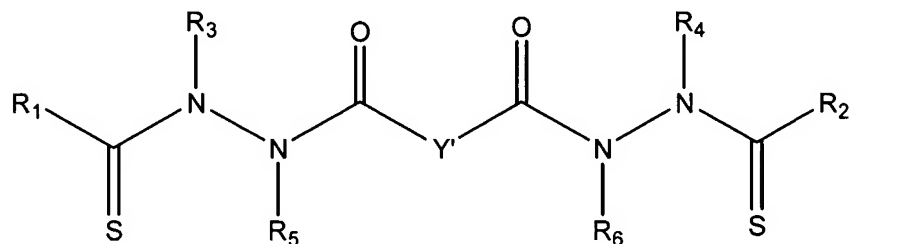
3. The method of Claim 2 wherein Y, taken together with both >C=Z groups to which it is bonded, is a substituted or unsubstituted arylene group.
4. The method of Claim 3 wherein the compound is represented by the following structural formula:

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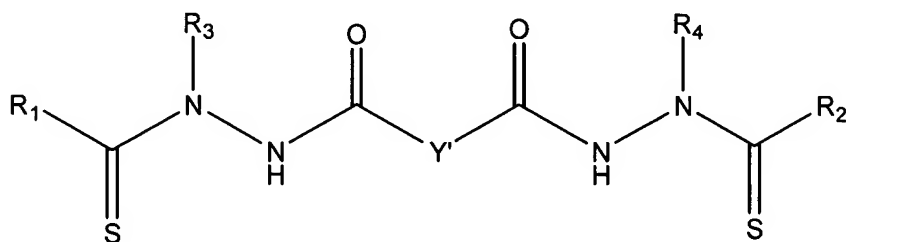
wherein Ring A is substituted or unsubstituted and X is -CH- or -N-.

5. The method of Claim 2 wherein Y is a covalent bond, a substituted or unsubstituted straight chained hydrocarbyl group or a phenylene group.
6. The method of Claim 5 wherein Y is a covalent bond, $-\text{C}(\text{R}_7\text{R}_8)-$, $-(\text{CH}_2\text{CH}_2)-$, *trans*-(CH=CH)-, *cis*-(CH=CH)-, $-(\text{CC})-$ or a 1,4-phenylene group.
7. The method of Claim 2 wherein the compound is represented by the following structural formula:



wherein Y' is a covalent bond or -C(R₇R₈)- and R₇ and R₈ are each independently -H, an aliphatic or substituted aliphatic group, or R₇ is -H and R₈ is a substituted or unsubstituted aliphatic group or substituted or unsubstituted aryl group, or, R₇ and R₈ taken together, are a C2-C6 substituted or unsubstituted alkylene group.

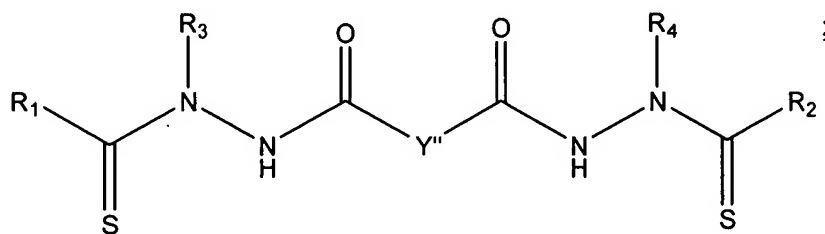
- 5 8. A method of treating a subject with a multi-drug resistant cancer, said method comprising administering to the subject an effective amount of a compound represented by the following structural formula:



or a pharmaceutically acceptable salt thereof, wherein:

- 10 Y' is a covalent bond or -C(R₇R₈)-;
 R₁ and R₂ are each a substituted or unsubstituted aryl group;
 R₃ and R₄ are each a substituted or unsubstituted aliphatic group;
 R₇ is -H; and
 R₈ is -H, an aliphatic or substituted aliphatic group.
- 15 9. The method of Claim 8 wherein R₁ and R₂ are the same and R₃ and R₄ are the same.
10. The method of Claim 9 wherein R₃ and R₄ are each an alkyl group and R₈ is -H or methyl.
11. The method of Claim 10 wherein R₁ and R₂ are each a substituted or
 20 unsubstituted phenyl group and R₃ and R₄ are each methyl or ethyl.

12. The method of Claim 11 wherein the phenyl group represented by R₁ and the phenyl group represented by R₂ are optionally substituted with one or more groups selected from -OH, -Br, -Cl, -I, -F, -OR^a, -O-COR^a, -COR^a, -CN, -NO₂, -COOH, -SO₃H, -NH₂, -NHR^a, -N(R^aR^b), -COOR^a, -CHO, -CONH₂, -CONHR^a, -CON(R^aR^b), -NHCOR^a, -NRCOR^a, -NHCONH₂, -NHCONR^aH, -NHCON(R^aR^b), -NR^cCONH₂, -NR^cCONR^aH, -NR^cCON(R^aR^b), -C(=NH)-NH₂, -C(=NH)-NHR^a, -C(=NH)-N(R^aR^b), -C(=NR^c)-NH₂, -C(=NR^c)-NHR^a, -C(=NR^c)-N(R^aR^b), -NH-C(=NH)-NH₂, -NH-C(=NH)-NHR^a, -NH-C(=NH)-N(R^aR^b), -NH-C(=NR^c)-NH₂, -NH-C(=NR^c)-NHR^a, -NH-C(=NR^c)-N(R^aR^b), -NR^dH-C(=NH)-NH₂, -NR^d-C(=NH)-NHR^a, -NR^d-C(=NH)-N(R^aR^b), -NR^d-C(=NR^c)-NH₂, -NR^d-C(=NR^c)-NHR^a, -NR^d-C(=NR^c)-N(R^aR^b), -NHNH₂, -NHNHR^a, -NHR^aR^b, -SO₂NH₂, -SO₂NHR^a, -SO₂NR^aR^b, -CH=CHR^a, -CH=CR^aR^b, -CR^c=CR^aR^b, -CR^c=CHR^a, -CR^c=CR^aR^b, -CCR^a, -SH, -SR^a, -S(O)R^a, -S(O)₂R^a, a non-aromatic heterocyclic group, a substituted non-aromatic heterocyclic group, a benzyl group, a substituted benzyl group, an aryl group or substituted aryl group, wherein R^a-R^d are each independently an alkyl group, substituted alkyl group, benzyl, substituted benzyl, aromatic or substituted aromatic group, or, -N(R^aR^b), taken together, form a substituted or unsubstituted non-aromatic heterocyclic group.
13. The method of Claim 1 wherein the compound is represented by the following structural formula:

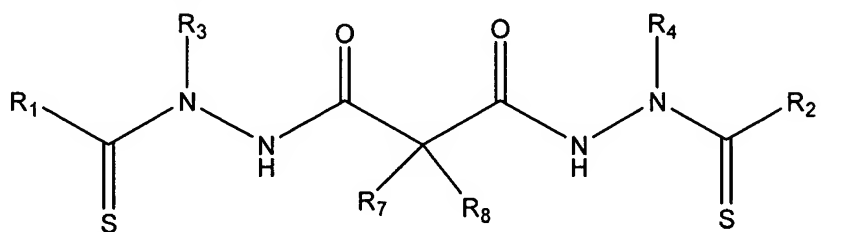


wherein

Y" is a covalent bond or -CH₂-; and

R₁ and R₂ are both a substituted or unsubstituted aliphatic group.

14. The method of Claim 13 wherein R₁ and R₂ are both C3-C8 cycloalkyl group optionally substituted with at least one alkyl group.
15. The method of Claim 14 wherein R₃ and R₄ are both a substituted or unsubstituted alkyl group.
16. The method of Claim 15 wherein R₁ and R₂ are both cyclopropyl or 1-methylcyclopropyl.
- 10 17. A method of treating a subject with a multi-drug resistant cancer, said method comprising administering to the subject an effective amount of a compound represented by the following structural formula:



or a pharmaceutically acceptable salt thereof, wherein:

- 15 R₁ and R₂ are both phenyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;
- R₁ and R₂ are both phenyl; R₃ and R₄ are both ethyl; R₇ and R₈ are both -H;
- R₁ and R₂ are both 4-cyanophenyl; R₃ and R₄ are both methyl; R₇ is methyl; R₈ is -H;

R_1 and R_2 are both 4-methoxyphenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

R_1 and R_2 are both phenyl; R_3 and R_4 are both methyl; R_7 is methyl; R_8 is -H;

5 R_1 and R_2 are both phenyl; R_3 and R_4 are both ethyl; R_7 is methyl; R_8 is -H;

R_1 and R_2 are both 4-cyanophenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

R_1 and R_2 are both 2,5-dimethoxyphenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

10 R_1 and R_2 are both 2,5-dimethoxyphenyl; R_3 and R_4 are both methyl; R_7 is methyl; R_8 is -H;

R_1 and R_2 are both 3-cyanophenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

15 R_1 and R_2 are both 3-fluorophenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

R_1 and R_2 are both 4-chlorophenyl; R_3 and R_4 are both methyl; R_7 is methyl; R_8 is -H;

R_1 and R_2 are both 2-dimethoxyphenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

20 R_1 and R_2 are both 3-methoxyphenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

R_1 and R_2 are both 2,3-dimethoxyphenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

25 R_1 and R_2 are both 2,3-dimethoxyphenyl; R_3 and R_4 are both methyl; R_7 is methyl; R_8 is -H;

R_1 and R_2 are both 2,5-difluorophenyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H;

R₁ and R₂ are both 2,5-difluorophenyl; R₃ and R₄ are both methyl; R₇ is methyl; R₈ is -H;

R₁ and R₂ are both 2,5-dichlorophenyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

5 R₁ and R₂ are both 2,5-dimethylphenyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 2,5-dimethoxyphenyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

10 R₁ and R₂ are both phenyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 2,5-dimethoxyphenyl; R₃ and R₄ are both methyl; R₇ is methyl; R₈ is -H;

R₁ and R₂ are both cyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

15 R₁ and R₂ are both cyclopropyl; R₃ and R₄ are both ethyl; R₇ and R₈ are both -H;

R₁ and R₂ are both cyclopropyl; R₃ and R₄ are both methyl; R₇ is methyl; R₈ is -H;

20 R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; Y' is bond;

R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ is methyl and R₈ is -H;

25 R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ is ethyl and R₈ is -H;

R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ is *n*-propyl and R₈ is -H;

R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both methyl;

5 R₁ and R₂ are both 1-methylcyclopropyl; R₃ and R₄ are both ethyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 1-methylcyclopropyl; R₃ is methyl, and R₄ is ethyl; R₇ and R₈ are both -H;

10 R₁ and R₂ are both 2-methylcyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 2-phenylcyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both 1-phenylcyclopropyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

15 R₁ and R₂ are both cyclobutyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R₁ and R₂ are both cyclopentyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

20 R₁ and R₂ are both cyclohexyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

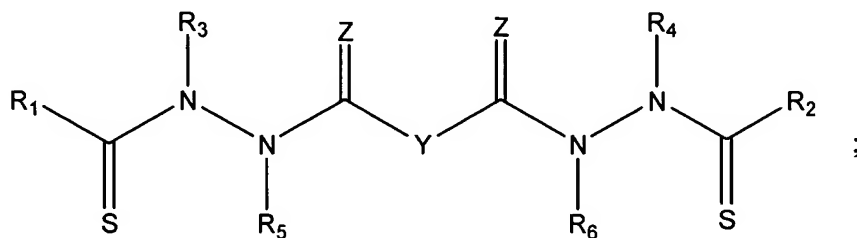
R₁ and R₂ are both cyclohexyl; R₃ and R₄ are both phenyl; R₇ and R₈ are both -H;

R₁ and R₂ are both methyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

25 R₁ and R₂ are both methyl; R₃ and R₄ are both *t*-butyl; R₇ and R₈ are both -H;
R₁ and R₂ are both methyl; R₃ and R₄ are both phenyl; R₇ and R₈ are both -H;
R₁ and R₂ are both *t*-butyl; R₃ and R₄ are both methyl; R₇ and R₈ are both -H;

R_1 and R_2 are ethyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H; or
 R_1 and R_2 are both *n*-propyl; R_3 and R_4 are both methyl; R_7 and R_8 are both -H.

18. A method of treating a subject other than a mouse with cancer, said method comprising administering to the subject an effective amount of a compound represented by the following structural formula:



or a pharmaceutically acceptable salt thereof, wherein:

- Y is a covalent bond or a substituted or unsubstituted straight chained hydrocarbyl group, or, Y , taken together with both $>C=Z$ groups to which it is bonded, is a substituted or unsubstituted aromatic group;

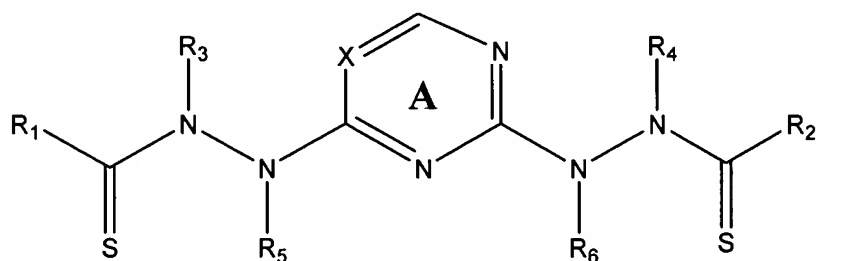
- R_1 - R_4 are independently -H, an aliphatic group, a substituted aliphatic group, an aryl group or a substituted aryl group, or R_1 and R_3 taken together with the carbon and nitrogen atoms to which they are bonded, and/or R_2 and R_4 taken together with the carbon and nitrogen atoms to which they are bonded, form a non-aromatic heterocyclic ring optionally fused to an aromatic ring;

R_5 - R_6 are independently -H, an aliphatic group, a substituted aliphatic group, an aryl group or a substituted aryl group; and

Z is =O or =S;

- wherein the subject is optionally co-administered a second anti-cancer agent other than taxol or an analog of taxol.

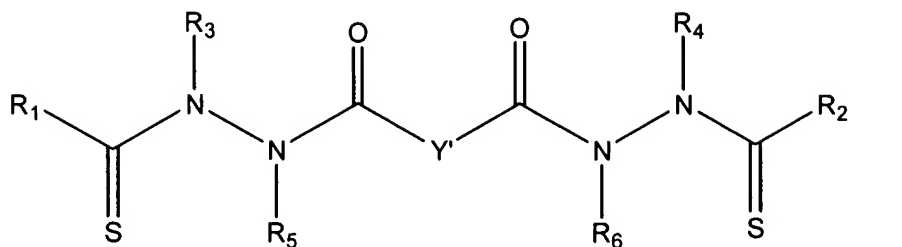
19. The method of Claim 18 wherein R_1 and R_2 are the same and R_3 and R_4 are the same.
20. The method of Claim 19 wherein Y, taken together with both $>C=Z$ groups to which it is bonded, is a substituted or unsubstituted arylene group.
21. The method of Claim 20 wherein the compound is represented by the following structural formula:



wherein Ring A is substituted or unsubstituted and X is -CH- or -N-.

22. The method of Claim 19 wherein Y is a covalent bond, a substituted or unsubstituted straight chained hydrocarbyl group or a phenylene group.
23. The method of Claim 22 wherein Y is a covalent bond, $-(CH_2CH_2)-$, *trans*-(CH=CH)-, *cis*-(CH=CH)-, $-(CC)-$ or a 1,4-phenylene group.
24. The method of Claim 19 wherein the compound is represented by the following structural formula:

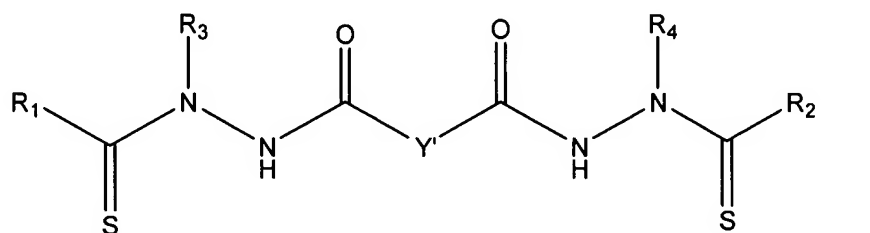
-105-



wherein Y' is a covalent bond or -C(R₇R₈)- and R₇ and R₈ are each independently -H, an aliphatic or substituted aliphatic group, or R₇ is -H and R₈ is a substituted or unsubstituted aryl group, or, R₇ and R₈ taken together, are a C2-C6 substituted or unsubstituted alkylene group.

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25. The method of Claim 24 wherein the compound is represented by the following structural formula:



Y' is a covalent bond or -C(R₇R₈)-;

10

R₁ and R₂ are each a substituted or unsubstituted aryl group;

R₃ and R₄ are each a substituted or unsubstituted aliphatic group;

R₇ is -H; and

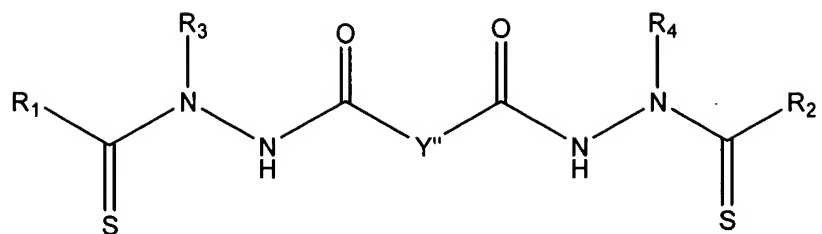
R₈ is -H, an aliphatic or substituted aliphatic group.

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26. The method of Claim 25 wherein R₁ and R₂ are the same and R₃ and R₄ are the same.

27. The method of Claim 26 wherein R₃ and R₄ are each an alkyl group and R₈ is -H or methyl.

28. The method of Claim 27 wherein R_1 and R_2 are each a substituted or unsubstituted phenyl group and R_3 and R_4 are each methyl or ethyl.
29. The method of Claim 28 wherein the phenyl group represented by R_1 and the phenyl group represented by R_2 are optionally substituted with one or more groups selected from -OH, -Br, -Cl, -I, -F, -OR^a, -O-COR^a, -COR^a, -CN, -NO₂, -COOH, -SO₃H, -NH₂, -NHR^a, -N(R^aR^b), -COOR^a, -CHO, -CONH₂, -CONHR^a, -CON(R^aR^b), -NHCOR^a, -NRCOR^a, -NHCONH₂, -NHCONR^aH, -NHCON(R^aR^b), -NR^cCONH₂, -NR^cCONR^aH, -NR^cCON(R^aR^b), -C(=NH)-NH₂, -C(=NH)-NHR^a, -C(=NH)-N(R^aR^b), -C(=NR^c)-NH₂, -C(=NR^c)-NHR^a, -C(=NR^c)-N(R^aR^b), -NH-C(=NH)-NH₂, -NH-C(=NH)-NHR^a, -NH-C(=NH)-N(R^aR^b), -NH-C(=NR^c)-NH₂, -NH-C(=NR^c)-NHR^a, -NH-C(=NR^c)-N(R^aR^b), -NR^dH-C(=NH)-NH₂, -NR^d-C(=NH)-NHR^a, -NR^d-C(=NH)-N(R^aR^b), -NR^d-C(=NR^c)-NH₂, -NR^d-C(=NR^c)-NHR^a, -NR^d-C(=NR^c)-N(R^aR^b), -NHNH₂, -NHNHR^a, -NHR^aR^b, -SO₂NH₂, -SO₂NHR^a, -SO₂NR^aR^b, -CH=CHR^a, -CH=CR^aR^b, -CR^c=CR^aR^b, -CR^c=CHR^a, -CR^c=CR^aR^b, -CCR^a, -SH, -SR^a, -S(O)R^a, -S(O)₂R^a, a non-aromatic heterocyclic group, a substituted non-aromatic heterocyclic group, a benzyl group, a substituted benzyl group, an aryl group or substituted aryl group, wherein R^a-R^d are each independently an alkyl group, substituted alkyl group, benzyl, substituted benzyl, aromatic or substituted aromatic group, or, -N(R^aR^b), taken together, form a substituted or unsubstituted non-aromatic heterocyclic group.
30. The method of Claim 14 wherein the compound is represented by the following structural formula:

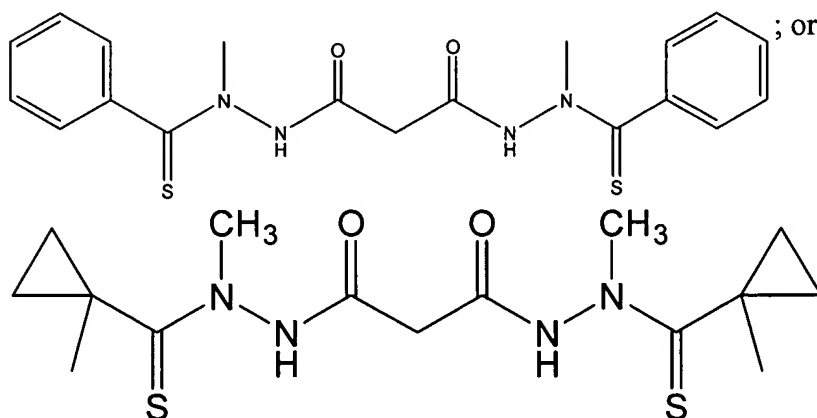


wherein

Y'' is a covalent bond or -CH₂-; and

R₁ and R₂ are both a substituted or unsubstituted aliphatic group.

- 5 31. The method of Claim 30 wherein R₁ and R₂ are both C3-C8 cycloalkyl group optionally substituted with at least one alkyl group.
32. The method of Claim 31 wherein R₃ and R₄ are both a substituted or unsubstituted alkyl group.
33. The method of Claim 32 wherein R₁ and R₂ are both cyclopropyl or 1-methylcyclopropyl.
- 10 34. The method of Claim 1, wherein the compound is:



35. The method of Claim 18, wherein the compound is:

